Faculdade de Economia da Universidade Nova de Lisboa

Risky behaviour and HIV/AIDS-related stigma in Zimbabwe

Marisa Amarante Soares
Masters in Economics, nr. 200

A Work Project carried out on the Globalization and Development Eonomics course, under the supervision of Professor Adeline Delavande

January 6th, 2010

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Abstract

HIV/AIDS-related stigma and discrimination have been getting more and more attention by researchers and policy-makers. Since stigma has direct impact on the way-of-living of PLHA[1] and their decision-making process, it can be an important key in the spread of HIV. Zimbabwe is one of the countries with the highest HIV prevalence rates and, thus, it would be interesting to investigate whether stigma had any impact on the course of the epidemic in that country.

My goal in this Work Project was to investigate the determinants of stigma at the individual level and the impact of stigma on individual behaviour (namely condom use and testing).

Keywords: HIV/AIDS, HIV prevalence, stigma, discrimination, condom use, testing, Zimbabwe

[1] PLHA stands for person or people living with HIV/AIDS

1. Introduction

HIV[2] is one of the most serious epidemics in the world. In less than three decades, it has caused the death of around 25 million people worldwide. Although the HIV prevalence rate has stabilized in recent years, there are still approximately 33 million people living with that condition (see 2008 UNAIDS report). HIV/AIDS-related stigma can be defined as a negative perception of someone that is only motivated by his HIV status (see Mahendra et al. 2006 and Maughan-Brown 2006). The disclosure of an HIV-positive status might lead to the discrimination and social exclusion of that person. Thus, individuals choose not to use condom nor to get tested in order to avoid being stigmatized. The objectives of this Work Project are to evaluate whether stigma has any influence on condom use and testing, which are very important tools in the fight against the spread of HIV. I will test two hypotheses: if personal characteristics influence HIV-related stigma at the individual level and if individual behaviour can be affected by the regional level of stigma.

2.1. The HIV/ AIDS epidemic in Zimbabwe

Sub-Saharan Africa has one of the highest rates of infection worldwide. This region is "disproportionately affected" by HIV because it has 67% of all HIV-positive individuals in the world and it includes most of the "high-prevalence countries"[3] (see Caldwell and Caldwell (1993)). The main routes of infection in Sub-Saharan countries are heterosexual intercourse and mother-to-child transmission[4] (see UNAIDS 2008 and UNGASS 2008).

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2 HIV is the acronym of "Human Immunodeficiency Virus". This condition compromises the individuals' immune system and, ultimately, causes their death. The last stage of HIV infection is known as AIDS (Acquired Immunodeficiency syndrome).

3 According to the UNAIDS definition, high-prevalence countries are those that have an HIV prevalence rate greater than 3%. Within Sub-Saharan Africa, the countries with the highest HIV rates in the period 1990-2007 are Uganda, Rwanda, Zambia, Malawi, Zimbabwe and South Africa.

4 Mother-to-child transmission can happen during pregnancy, delivery or through breastfeeding.

In Zimbabwe, the evolution of the adult HIV prevalence[5] was very fast. According to the UNGASS report, the first case of HIV was reported in 1985 (see UNGASS 2008). In the next twelve years, there's a sharp increase in the HIV rate until a maximum rate in 1997, year in which almost one-third of the Zimbabwean population was HIV-positive (see Figure 1). After a period of stabilization, there was a rapid decrease in the HIV rate during the 2000s. In 2007, the HIV prevalence was estimated to be around 15,6% (see UNGASS 2008) which, despite still being unacceptably high, is an undeniable improvement over their mid-1990s rates.

The high prevalence rates during the majority of the 1990s can be explained by economic and political factors. The fight against the HIV/AIDS was not a priority for the government , so there wasn't enough financial support for HIV awareness and for making treatments and antiretroviral medication available to those in need (see Rodriguez 2007). Moreover, Zimbabwe is an enclosed country[6], so its economic activity heavily relies on a "well-developed [road] infrastructure" (see IOM Briefing). This aspect promotes a high level of labour mobility, which is positively associated to the spread of the HIV epidemic[7] (see Cohen 1993, IOM Briefing and Oster 2009). This expansion of "sexual networks" and the possibility that workers can regularly return home[8] increases the likelihood of spreading the HIV epidemic across regions (see Caldwell and Caldwell (1993)). In Zimbabwe, teenagers are encouraged to have sex and marry while still young; this fact explains why approximately 50% of the PLHA acquired the virus when they were teenagers (see Rodriguez 2007).

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5 The adult prevalence rate is the estimated number of adults living with HIV/AIDS as a percentage of the total adult population (with ages between 15-49 years). The population data is all calculated at the end of the year.

6 Zimbabwe does not have any maritime borders.

7 The physical separation from their spouses and their communities promotes the isolation and relaxation of social norms, which may give incentives for the migrant workers to engage in extramarital relationships (see IOM Briefing). It's also important not to forget that migrant workers tend to be younger and more risk-takers, which may lead them to adopt riskier behaviours (Cohen 1993)

8 The development of the Zimbabwean road system promoted the increase in HIV prevalence within rural areas (see Mundandi et al. 2006). Moreover, there's evidence that towns that are located near the borders have high HIV rates and that truck drivers tend to engage in risky behaviour (see IOM Briefing). The combination of these factors gives support to the theory that there's a short-term positive relationship between exports and HIV prevalence (see Oster 2009) . According to Oster, in enclosed countries, an increase in the economic activity boosts the trucking activity. Since truck drivers are at high risk of HIV, there's an hypothesis that there would be a rise in the number of HIV infections (see Oster 2009) . In figure 2. we can observe that value of exports between 1985 and 2007 followed the same trend as the HIV prevalence over the same period. This reinforces the hypothesis that Oster's theory is applicable to Zimbabwe (in the short-run).

In Zimbabwe, as in other Sub-Saharan countries, men tend to have more extramarital partners than women (see Caldwell and Caldwell 1993)) and polygamy is common. Zimbabwean women are also more vulnerable to HIV because they are poorer and relatively less educated[9]. Poverty and lack of economic security encourages women to engage in risky behaviours (see UNAIDS article). The combination of all the previous factors explains why approximately 60% of the HIV-positive Zimbabweans are female (see UNAIDS 2008 report). The sharp decline in the HIV prevalence rate during the 2000s has been justified with an increase in the mortality rate, as many individuals may have succumbed after being HIV-positive for some years (see DFID 2006). Moreover, Zimbabwe's economic decline[10] may have driven PLHA into poverty and lack of medication. If their immune system is weakened from hunger, then the progression of HIV into the AIDS stage can be faster (see Rodriguez 2007) and mortality rates can increase. Nevertheless, other papers claim that the decline in the HIV rates result from changes in the sexual behaviour , such as reductions in the number of casual sex partners, more condom use in non-committed relationships, increase in the age at the first sexual activity (see Gregson et al. 2006) and "reductions in the rate of sexual partner change"[11] (see Mugurungi et.al). These changes in may have resulted from rational decision-making[12] and from an improvement in the HIV-related (see UNAIDS 2005).

2.2. Stigma: a literature review

The existence of HIV/AIDS-related stigma and discrimination has been getting more and more attention by researchers and policy-makers because of its direct impact on the way-of-living of

[9] The estimated female literacy rate in 2003 was of 87,2% versus 94,2% for men (Cohen 1993)

[10] During the years of HIV prevalence decline, the government started a land redistribution program that caused a reduction of agricultural output and increasing rates of unemployment (see AVERT website). The dismantlement of the rural economy and consequent economic slowdown may have contributed to a decrease in HIV prevalence, as argued by Oster 2009.

[11] However, it has also been argued that, if individuals with "above-average sexual partner changes" died from HIV/AIDS, then it is likely that there would be a decline in the "rate of partner change" (see UNAIDS 2005), even without any explicit change in behaviour by the remaining population.

[12] Individuals may have decided to change their behaviour and make safer choices due to the alarming infection and death rates (see Mugurungi et.al). This explains why there was a considerable reduction in HIV prevalence in individuals with more years of education (see Gregson et al. 2006).

PLHA[13]. Stigma is a “negative perception” that people form about individuals that have undesirable and readily-observable characteristics (see Mahendra et al. 2006 and Aggleton). It can also be described as a feeling of disapproval of someone with a given condition or in a specific situation, that can result in treating that person differently (see Cambridge Dictionaries Online). Stigma has also been described as a power mechanism used by the dominant social group in order to undermine over stigmatized groups and maintain social inequalities (see Parker and Aggleton 2003 and Ogden and Nyblade 2005). More specifically, HIV/AIDS-related stigma consists in the “devaluation and loss of reputation” of everyone who is suspected of being infected, which is likely to trigger their discrimination and social exclusion (see Maughan-Brown 2006).

HIV/AIDS is a highly stigmatizing condition and many Zimbabweans are discriminated because of their HIV status, in spite of the high prevalence rates (see AVERT website). . First, it has no known cure and PLHA are expected to suffer from an inevitable and disfiguring death (see Ogden and Nyblade 2005). The lack of knowledge about HIV transmission and the “rapid spread of the disease” magnify the level of anxiety and uneasiness surrounding HIV, thus increasing stigma (see Ogden and Nyblade 2005). Since sexual intercourse is one of the vectors of transmission, people often establish a link between one’s HIV status and some kind of sexual misconduct. In Zimbabwe, HIV is also frequently associated with groups that are already marginalized by mainstream society, such as IV drug users, prostitutes and homosexuals[14] (see Aggleton, Maughan-Brown 2006). Consequently, there's a general belief is that HIV/AIDS is a punishment for immoral behaviour (see Aggleton). For all of the above, HIV is one of the most stigmatizing diseases, with which people are ashamed to be associated (see Muyinda et al. 1997). They consider it to be a ”death sentence”, so individuals prefer not get tested altogether or even refuse to receive treatment (see DFID 2007 and DFID 2006 ii). In the event that they get tested and receive an HIV-positive result, it’s unlikely that they will disclose their results to the people of interest (see Ogden and Nyblade 2005).

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13 PLHA stands for person or people living with HIV/AIDS

14 PLHA are often considered inferior and dismissed as promiscuous or as intravenous drug users (see Ogden and Nyblade 2005).

2.2.1. Dimensions of stigma: fear of casual contact

HIV-related stigma is a complex phenomenon that can be subdivided into different dimensions. I will explain those according to the terminology used in Nyblade and MacQuarrie (2006) and in Ogden and Nyblade 2005).

Possessing correct knowledge about HIV and the methods of protection does not always remove incorrect beliefs about HIV (see Ogden and Nyblade 2005, Kidd and September 2003). Common fears are that HIV can be transmitted through infected objects and mosquito bites (see Ogden and Nyblade 2005). Moreover, PLHA often suffer from tuberculosis or diarrhea[15], which reinforces the fear of getting infected through "non-sexual casual contact" (see Kidd and September 2003 and Ogden and Nyblade 2005). "Fear of casual transmission" leads people to incorrectly believe that they are at risk if they have any type of contact with PLHA[16] (see Ogden and Nyblade 2005). This type of stigma leads people to believe that PLHA are a hazard to their own health (see Maughan-Brown 2006). As a result, if there's a perception that someone is seropositive, most people will avoid contact with them and that person can be excluded from the community (see Aggleton). For instance, people may refuse to buy food prepared by her and family members may stop sharing objects with them (see Ogden and Nyblade 2005). In extreme cases, PLHA can be expelled from their households and communities or lose their jobs. It's important to note that the HIV-positive may also not be fully informed about HIV transmission, and incorrectly perceive themselves as being threat to those close to them (see Kidd and September 2003) . The consequences can be self-imposed isolation and self-stigma[17] (see Kidd and September 2003).

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15 Tuberculosis and diarrhea are transmitted by air and contaminated food and water, respectively (see Ogden and Nyblade 2005). As many PLHA suffer from those conditions, people become afraid that HIV can also be transmitted in those ways (see Ogden and Nyblade 2005).

16 Quoting Ogden and Nyblade (2005), there is "fear that HIV could be transmitted through (…) simple touch, (…), eating food prepared by [PLHA], breathing infected air or using objects that someone living with HIV and AIDS had touched".

17 Self-stigma is the type of stigma in which PLHA feel ashamed, blame themselves for their status and choose to avoid social interactions (see Kidd and September 2003).

2.2.2. Dimensions of stigma: moral stigma

As previously mentioned, HIV is considered a disease of "outsiders", because there's a strong association with negative behaviours and with groups that are already excluded from society[18] (Ogden and Nyblade 2005, Maughan-Brown, B. G. (2006)). Stigma often consists in making judgements regarding someone's values or behaviour solely based on their HIV status (see Aggleton). Since HIV is preventable, PLHA are blamed and deemed irresponsible for making a choice to engage in "sexual wrongdoing" (see Maughan-Brown 2006). As expected, this dimension of stigma is stronger in regions or countries that are more religious (which is the case of Zimbabwe), in which many people believe that HIV is a punishment from God for immoral behaviour (see Aggleton). The consequence of this type of stigma is that those suspected of being seropositive can be subject of gossip, speculation about the way of infection, insults, rejection and overall condemnation for bringing shame upon their families and communities (see Kidd and September 2003) . Another dangerous aspect is that value-based stigma creates a false sense of security: if people believe that they are not at risk of contracting HIV (because they have a different moral conduct from the "others"), then they won't take the necessary measures to protect themselves (see Maughan-Brown 2006).

2.2.3. Stigma and gender

Stigma is also gender-biased. Not only are women more vulnerable to the infection (see DFID 2006), but they also tend to be more stigmatized than men. In Sub-Saharan Africa (and Zimbabwe is no exception to this rule), there's a paternalistic view of sexuality[19] and women are considered

[18] A consequence of this association is that the marginalized groups are even more stigmatized, which is known as "double stigma" (see Maughan-Brown 2006). For example, if there is compulsory HIV testing of sex workers, this will reinforce the view that they are "disease carriers". As a result, they will be even more isolated from mainstream society, which can menace HIV prevention (see Maughan-Brown 2006)

[19] It's normal for men to indulge in multiple relationships while women are supposed to be righteous and strictly monogamous (11, 29).

responsible for the transmission of HIV and other STI's[20] (see Aggleton). HIV-positive women represent everything that they should not be[21] in these societies and are, therefore, blamed for bringing the disease into their families[22] (see Aggleton). It's also important to keep in mind that poverty encourages women to engage in commercial sex (13) and prevents them from insisting on condom use with their partners, which increases their risk of becoming HIV-positive (see DFID 2006).

2.3. Consequences of stigma

Stigmatization of PLHA can take many forms. Ogden and Nyblade (2005) argue that the main forms of stigma are physical, social, verbal and institutional[23]. It's also important not to forget the role of internal stigma. The real or imagined consequences of the disclosure of an HIV-positive status can have a negative impact on seropositives, who may experience feelings of hopelessness, low self-esteem (see AVERT website), self-imposed isolation[24], depression and, in extreme cases, suicide (see Rankin et al 2005). In Zimbabwe, it's common for families to take care of their sick members. The ones that have HIV-positive members face external and internal stigma[25] (see Hamra et al.

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20 STI's are sexually transmitted infections, which are considered to be "women's diseases" in that region. (see Aggleton)

21 The characteristics that are associated with a seropositive female are slim, unhealthy, dependent on external care and sexually deviant, which are the opposite qualities that an "ideal" woman in these societies should have (see Ogden and Nyblade 2005)

22 In some cases, the widows of men that died from HIV/AIDS are blamed for their deaths (even if they were infected by their husbands) and often lose respect, family support and may even lose the rights to inherit the land and other assets.

23 According to their definitions, physical stigma includes segregation of PLHA and their personal belongings and violence (which is fairly uncommon) (see Ogden and Nyblade 2005). Social stigma is defined as a loss of reputation, loss of respect and exclusion from important events within the community as a consequence of the HIV-positive status (see Ogden and Nyblade 2005). Verbal stigma includes being blamed, threatened or made fun of for being HIV-positive (see Ogden and Nyblade 2005). Institutional stigma can range from the loss of business and employment opportunities, loss of rights, being denied treatment in hospitals and negative depictions on the media (see Ogden and Nyblade 2005).

24 The rest of the society also loses with seropositives' self-imposed isolation: if don't share their experiences with those around them, then the fight against the HIV epidemic is weakened (see Rankin et al 2005).

25 External stigma takes place when the entire family is rejected, discriminated against and loses reputation because of a HIV-positive member (see AVERT website). Internal stigma happens when PLHA are discriminated, abused or mistreated within their households (see Hamra et al. 2006). Common examples of internal stigma are when PLHA's objects are separated from the remaining ones, if that person is hidden from the community or is even expelled (Ogden and Nyblade 2005).

2006). Internal stigma is closely related to the fact that HIV is an incurable condition[26] (see Kidd and September 2003) . Caring for a PLHA implies considerable medical expenses, and an impoverished household may perceive an HIV-positive member to be a threat to their livelihood (see Kidd and September 2003). Stigma can be an obstacle to testing, disclosure and care for PLHA (see Ogden and Nyblade 2005). HIV stigma can also prevent people from suggesting the use of condoms, because of fears that their partner may view it as a sign of infidelity or lack of trust. As result, people often get infected by their spouses (who may be aware of their status or not). For the same reasons, people who are aware of their HIV-positive status are often afraid to get treatment or attend healthcare settings that are known for treating PLHA (see Mahendra et al. 2006). By serving as a barrier to testing, disclosure and condom use, HIV/AIDS-related stigma serves as a "driver of the epidemic". It's important not to forget that HIV has a tremendous impact on the economy, as reduces it national savings and and labour supply (those factors will in turn have an impact on GDP and productivity)(see Cohen 1993). Thus, assessing stigma can be a valuable tool for preventing the spread of HIV and guaranteeing the country's economic survival.

3. Data

3.1.Demographic and Health Survey (DHS)

USAID[27] is a federal government agency that provides foreign assistance in different regions of the world. In 1984, USAID created Measure DHS (Demographic and Heath Surveys). This program provides technical support to agencies in developing countries to conduct nationally-representative surveys. DHS collect extensive data on fertility, nutrition, HIV/AIDS and tuberculosis, among other topics, in over sixty countries. The goals of the DHS project are to improve data collection, cross-

[26] There´s a misconception that an HIV infection means immediate disability and death (in fact, seropositives are often called "walking corpses") (see Kidd and September 2003)

[27] USAID stands for United States Agency for International Development. USAID's field work includes implementing measures to foster economic development, helping countries transition into democratic regimes and improving health conditions.

country analysis and survey methodology. DHS also helps policy-makers by providing them accurate and extensive data on demographic and health-related issues. In this Work Project, I used data from the Standard DHS Surveys[28], which are questionnaires with very large sample sizes and that are usually conducted with 5-year intervals between them. The relevant survey for this Work Project is the DHS Zimbabwe 2005/2006.

3.2. DHS Zimbabwe 2005/2006

The DHS Zimbabwe 2005/2006 is a survey that occurred at the national level and, for which, 9,285 households from ten regions were interviewed on different demographic and health aspects[29]. The sample is representative of the Zimbabwean population as it includes people from both the rural and urban areas.

I used an all-women sample in this estimation. I excluded men from my sample so that the results would not be biased by the inclusion of couples (variables such as condom use and HIV risk would certainly be affected). In this Work Project, I chose the DHS questions that were related with HIV/AIDS and attitudes towards PLHA. Then, I used them as variables to test my hypotheses. Next, my variable choices will be justified.

3.3. Stigma variables

In this WP, I used three dimensions of stigma: fear of casual contact, moral-based stigma and enacted stigma. First, it will be tested if there is any association between personal characteristics and the stigma dimensions at the individual level. Second, I will test if the individual behaviour (namely, condom use and testing) are influenced by the regional averages of stigma.

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[28] DHS datasets are available in their website (the access is only conditional to online registration on http://www.measuredhs.com).

[29] In this survey, 8.907 women and 7.175 men were interviewed. Before being interviewed, each respondent was informed about the goal of the study. They were also told that their participation was strictly voluntary. Afterwards, respondents gave a written consent for their participation in the study.

As previously explained, fear of casual contact often translates into an apprehension that a minimal non-sexual contact with PLHA or with their personal belongings can cause HIV transmission. The DHS question that was chosen for this dimension was the willingness to buy vegetables from an HIV-positive person (see question nr. 1 from Table 1). For the moral dimension of stigma, I chose questions 2-4, because those expressed some degree of moral judgement regarding the values or conduct of a PLHA (see Table 1). Since there are three questions that address this dimension, I used them to create a dummy variable called "Moral stigma"[30]. The third dimension of stigma is enacted stigma. This variable Based on questions 5 and 6 (see Table 1), I created a new variable called "enacted stigma"[31], which encompasses actual experiences of discrimination that the respondent has witnessed. It's important to note that all of stigma questions were formulated in a way that nobody had to admit to being the victims or the perpetrators of any acts of discrimination, which would lead to under-reporting[32].

I also evaluated the impact of the stigma on testing and condom use. In order to do that, I computed the regional averages of the stigma variables mentioned above. A region is appropriately sized because it is a spatial unit that is neither too small nor too large (so that the impact on individual choice would not be lost). It makes sense that someone's behaviour can be modified by the average level of stigma within their respective region. Thus, the stigma variables were averaged at the region level. Another stigma variable that was created was the average of the three dimensions (fear of casual contact, morality-based stigma and enacted stigma) at the regional level. This new stigma variable was called "Stigma index" and it was meant to measure the average level of stigma per region.

3.4. Stigma determinants

[30] This dummy has a value of 1 if the respondent either had the opinion that a PLHA should be blamed or ashamed of his status or if they thought that a PLHA should not be allowed to teach.

[31] Enacted stigma is equal to one if the respondent either knows an HIV-positive person that has been denied care in an healthcare setting or if she knows a PLHA that has suffered social discrimination because of that condition.

[32] There would be under-reporting of stigma because people would try not to give socially undesirable answers - "social desirability bias

The next step was to choose the survey questions that could be correlated with stigma. First, I chose DHS questions that indicated personal characteristics, such as age, income, education, place of residence and religion. To measure age, I used survey question nr.7 (see Table 1). To represent income, I cre*ated "Money",* which is a dummy variable that indicates if the respondent has a large income[33]. To measure education, I created a dummy variable called "educational achievement" [34] based on question nr.8 (see Table 1). Furthermore, I constructed a dummy variable that signals if the respondent lives in a rural area or not. To address religion, a dummy variable was created in order to assess if being a Catholic had any impact in expressing higher levels of stigma (when compared to being Protestant or Muslim). Another variable that can be associated with stigma is the perceived level of HIV risk, for which I created a dummy variable called "AIDS risk"[35] (see question nr.9 from Table 1). It was also necessary to include variables that indicated the level of knowledge regarding HIV transmission and means of protection. An indicator of HIV/AIDS-related knowledge can be if the respondent is able to name at least one form of protection from HIV (see question nr.10 from Table 1). From that question, a new variable called "means of avoiding HIV" was originated[36]. It was also important to check if the respondents maintained any false beliefs. Thus, I created a dummy variable called "incorrect beliefs"[37] based on questions nr. 11, 12 and 13 (see Table 1). It was also interesting to test whether having a seropositive acquaintance had any relation with the level of prejudice that someone has against a PLHA. For that reason, I used the question nr.14 as another independent variable (see Table 1).

3.5. Condom use

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33 DHS created a wealth index that ranged from 0 (the poorest) to 5 (the richest). "Money" is a dummy variable with value 1(if the respondent belongs in the richest categories - wealth index greater or equal to 4) and value 0 (if otherwise).

34 "Educational achievement" is equal to 1 if the respondent has an education level that is greater or equal to incomplete secondary education.

35 AIDS risk is a dummy variable that is equal to 1 if the respondent admitted to any level of risk.

36 "Means of avoiding HIV" is equal to 1 if the respondent was able to name at least one of the following methods of protection from HIV: condom use, abstinence or monogamy.

37 "Incorrect beliefs" is a dummy variable that is equal to 1 if there's a negative answer to questions nr. 11 or a positive answer in questions 12 and 13 (see Table 1).

One of the goals of this Work Project is to test whether stigma is correlated with an unsafe sexual behaviour. Condom use has been the main focus of HIV prevention campaigns, so, for that reason, question nr. 15 was the chosen one [38] (see Table 1).

3.6. Testing

Another goal of this Work Project is to test whether stigma is correlated with the decision to be tested for HIV. The DHS survey item was used that address this domain was question nr. 16[39] (see Table 1).

3.7. Other Independent variables

Now I'm going to justify the other variables that I chose as determinants of risky behaviour. It is important to take into account that women's ability to ask their partners to use protection can influence their engagement in risky behaviour (see AVERT website). This ability to negotiate safe sex can be measured by using question nr. 17 (see Table 1). Another relevant variable is the existence of multiple sexual partners, for instance whether the respondent's husband has other wives. In order to have an appropriate proxy, I created a dummy variable called "polygamy"[40] based on question nr. 18 (see Table 1). The partner's decision to get tested can also influence individual choices, so I also considered it as an independent variable[41].

4. Determinants of social stigma

[38] It's important to note that, if the respondent has more than one sexual partner, the question regarding condom use refers to the most recent one.

[39] In the DHS survey, there are many questions regarding the testing decision (please note that the interviewers always stressed that they did not want to know the result). It would have been interesting to evaluate when did the HIV test happen (if ever). However, the survey question "*When was the last time you were tested for the AIDS virus?"* had many missing values and these did not correspond to the number of respondents who had never been tested. As a result, this question was disregarded.

[40] "Polygamy" is a dummy variable which is equal to 1 if the respondent's partner has other wives and is equal to 0 if otherwise.

[41] Another question that could have been used as a variable was "*Do you know of a place where people can go to get tested for the AIDS virus?"*. However, all the respondents that answered negatively did not get tested. According to STATA, a negative answer "perfectly predicts failure" and, therefore, this variable could not be used.

4.1. Hypotheses

(Equation 1) Would buy vegetables[42] = β_0 + age β_1 + Catholicβ_2 + Moneyβ_3 + rural residenceβ_4 + educational achievement β_5 + AIDS risk β_6 + incorrect beliefs β_7 + means of avoiding HIVβ_8 + knows seropositive personβ_9 + ε

(Equation 2) Moral stigma = β_0 + age β_1 + Catholic β_2+ Money β_3 + rural residence β_4+ educational achievement β_5 + AIDS_riskβ_6 + incorrect beliefs β_7 + means of avoiding HIV β_8 + knows seropositive person β_9 + ε

In the next section, I will present the hypothesis that, at the individual level, stigma variables are influenced by personal characteristics. I didn't perform a regression on enacted stigma because the results would not be very meaningful for this analysis.

Regarding the relationship between stigma and age, one would expect that younger people would be less judgemental and more informed about one's HIV condition. However, Hamra et al. (2006) found that teenagers displayed significantly more stigmatizing attitudes when compared to other age groups. Therefore, the sign of the correlation between those variables can either be positive or negative. The Catholic Church is well-known for having a strict view of sexuality, so Catholics may tend to view one's HIV status as a direct consequence of a sinful behaviour (see Kidd and September 2003) , thus expressing a higher level of morality-based stigma. As a consequence, the correlation between stigma and being Catholic should be positive. Regarding the variable "Money", people with more income are more prepared to take care of a seropositive family member[43], if necessary. This could decrease stigmatizing beliefs towards PLHA (see Kidd and September 2003). Therefore, I expect the correlation between stigma and the Money variable to be negative. People that live in a rural area tend to be more traditional and are more inclined to exclude those who do not have a "morally-appropriate" behaviour. Consequently, I expect rural residence to be positively correlated with stigma. According to Hamra et al. (2006), there is "(more expressed stigma) in those

[42] Please be aware that an increase in the variable "would buy vegetables" indicates a *decrease* in stigma.

[43] Since they have more economic security, caring for a PLHA will not be such a heavy constraint on budget of people with more income.

with primary education compared to those who attended University". Thus, educational achievement and stigma should be negatively correlated. Regarding the variable "AIDS risk"[44], the intuition is that, if someone considers herself to be at risk of getting HIV, then she will probably be more sympathetic towards PLHA. As a result, the expected relationship between AIDS risk and stigma is a negative one. As previously explained, having incorrect beliefs and HIV knowledge should be, respectively, positively and negatively correlated with stigma. Finally, when the respondent knows someone with HIV/AIDS, I expect her to feel more compassion towards those that are in that condition[45]. Thus, stigma should be negatively correlated with the variable "knows a seropositive person".

4.2. Estimation results and discussion

Data preparation and estimation were performed with STATA software version 9.1. All the regressions had dependent variables with two possible outcomes (binary outcomes)[46]. I chose the logistic regression model to perform all the regressions. I report all the estimated coefficients, standard errors, p-values, marginal effects and 95% confidence intervals associated with each regression. The estimators were considered statistically significant if the respective p-value (P) was equal or less than 5%[47][48].

When analysing the estimation of the determinants of fear of casual contact (see equation 1 and Table 4), most of the results were consistent with our expectations. The estimators for being

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44 The variable "AIDS risk" indicates whether the respondent considers herself to be at risk (whether because she has more than one partner, lack of knowledge regarding her HIV status or if her partner is not monogamous, among others).

45 This hypothesis is based on the assumption that the PLHA that the respondent knows does not belong to one of the risk groups – prostitutes, IV drug users and homosexuals.

46 When there are binary outcomes, performing the regressions according to the logit and the probit model is more appropriate. Since estimation of a binary outcome model is done by maximum likelihood, it's necessary to make sure that the estimated probabilities associated with each outcome are between zero and one.

47 This level of significance means that the T-statistic is equal or greater than |1,96|

48 Since these models have binary outcomes, the goodness-of-fit measure that was used is the pseudo-R^2. The pseudo-R^2indicate whether a given model is more helpful in the prediction of the observed data than a model that only has a constant as a parameter. In the regressions that were performed, the pseudo-R^2 varied between 0,0311 and 0,1322. These indicators of goodness-of.-fit can be considered low, but low pseudo-R^2 are a common feature of binary outcome models. Another specification test that was performed was the likelihood ratio test. The latter tests if the parameters are jointly statistically different from zero. In all the regressions, the likelihood ratio tests rejected the hypotheses that the coefficients were jointly equal to zero. In other words, the models as currently specified represent an improvement over the models in which all the parameters (apart from the constant term) are equal to zero.

Catholic (B[49]=-0.315;P=0,003) and having incorrect beliefs (B=-0,428;P=0,00) were negative and statistically different from zero. The estimators for educational achievement (B=0,673; P=0,00), rural residence (B=0,417; P=0,00) and risk of getting AIDS (B=0,322; P=0,00) were all found to be significantly positive. The estimators for age, money, means of avoiding HIV and knowing a seropositive person were found to be statistically insignificant (P=7,69%<5%, P=14,6%<5%, P=7,65%<5%, respectively). Regarding equation 2, the estimators for age, rural residence and knowing means of avoiding HIV were not found to be statistically different from zero (P=0,25, P=0,308, P=0,25) (see Table 5). The estimators for Catholic (B=0,264; P=1,7%), incorrect beliefs (B=0,526; P=0,00) and knowing a seropositive person (B=0,4498; P=0,00) were all significantly positive. The estimators for money (B=-0,788; P=0.00), educational achievement (B=-0,465; P=0,00) and AIDS risk (B=-0,605; P=0,00) were found to be negative and statistically different from zero.

Being Catholic is positively correlated with moral-based stigma. HIV is linked to behaviours such as prostitution, homosexuality and promiscuity, which are considered to be “sins” by the Catholic religion. This fact can also explain why there's a negative relationship between being Catholic and the stigma dimension “Would buy vegetables from a HIV-positive vendor”. Nevertheless, Hamra et al.(2006) had opposite results – in their paper, there was evidence that Catholics displayed less “expressed stigma” than Protestants (see Hamra et al. 2006). The variable money was found to be insignificant when regressing for fear of casual contact, which seems to be evidence that income does not affect this stigma dimension. However, money was negatively correlated with moral stigma. This is consistent with our reasoning that poorer individuals tend to blame PLHA for their status. Caring for a seropositive person or losing the main provider because of AIDS may be a serious problem for a household with few resources. This view is also corroborated by Kidd et al. (2003). Education and having *correct* knowledge about HIV were found to be negatively correlated with stigma. This reinforces the notion that investing in education and HIV awareness campaigns can be

[49] I used B as a notation for the estimated value of β.

a good solution to reduce stigma, even if the estimator for HIV knowledge (means of avoiding HIV) was not found to be statistically significant. It's important to note that people should be educated on the ways that they can and cannot be infected with HIV (see Ogden and Nyblade 2005). Besides eliminating possible doubts, it prevents the imagination of "what-if" scenarios that lead to an overestimation of the risk of getting HIV during a casual interaction with a PLHA (for example, "What if a mosquito stings a HIV-positive person and, right after, stings me. Will I get infected with the virus?"). However, Hamra et al. (2006) argue that these positive effect of increasing HIV knowledge is limited: they consider that "more information may (...) decrease stigma but it's not sufficient to eliminate stigma completely"(see Hamra et al. 2006). As expected, an increase in the personal assessment of risk is correlated with a lower level of stigma, ceteris paribus. There was no significant correlation between rural residence and moral stigma, but the former variable was found to be positively correlated with fear of casual contact, which was not the expected result. Moreover, knowing an HIV-positive person was found to be positively correlated with moral stigma. This result does not coincide with our predictions and also contradicts the findings of Hamra et al (2006). The latter found evidence that "less stigma is associated with (...) personal acquaintance of one or more PLWA". Since many people do not disclose their HIV-positive status, the results could have been affected.

5. The influence of social stigma on condom use and testing

5.1. Hypotheses

(Equation 3) condom use = β_0 + stigma index β_1 + ageβ_2 + Moneyβ_3 + rural residenceβ_4 + incorrect beliefs β_5 + female bargaining powerβ_8 + polygamyβ_9 + ε

(Equation 4) condom use = β_0 + regional average of fear of casual contactβ_1 + ageβ_2 + Moneyβ_3 + rural residenceβ_4 + incorrect beliefs β_5 + female bargaining powerβ_8 + polygamyβ_9 + ε

(Equation 5) condom use = β_0 + regional average of moral stigmaβ_1 + ageβ_2 + Moneyβ_3 + rural residenceβ_4 + incorrect beliefs β_5 + female bargaining powerβ_8 + polygamyβ_9 + ε

(Equation 6) condom use = β_0 + regional average of enacted stigma β_1 + ageβ_2 + Moneyβ_3 + rural residenceβ_4 + incorrect beliefs β_5 + female bargaining powerβ_8 + polygamyβ_9 + ε

There's the hypothesis that the individual choice of using condom can be negatively influenced by *external stigma* (i.e., the possibility that one can be stigmatized by his partner or a third party). The main rationale is that, if there's a higher stigma level, people will refrain from requesting their spouse to use a condom for fear of being accused of infidelity or inappropriate behaviour. Younger respondents may be more aware of the need of using protection, but older ones have more experience in sex-related issues. Thus, the correlation between age and condom use is unclear. Regarding money, an increase in the income level will increase the demand for condoms[50], thus increasing the chances that the respondent used a condom in the last relationship. In conclusion, money and condom use should be positively correlated. The respondents that live in rural areas may have less access to condoms and, thus, rural residence should be negatively correlated with condom use. Another hypothesis is that, if the person has incorrect beliefs about HIV, then she will underestimate the need of using a condom to protect herself from HIV. Thus, incorrect beliefs should be negatively correlated with condom use. The variable "wife can request condom" is a measure of female bargaining power. For this reason, we expect that, when a female has more bargaining power in sex-related issues, there will be a higher percentage of women reporting that they used a condom in the last intercourse, *ceteris paribus*. Thus, the variables should be positively correlated. Regarding polygamy, I expect that if the respondent's husband is polygamous, then there are more incentives to use a condom. Therefore, polygamy and condom use should be positively correlated.

(Equation 7) ever been tested = β_0 + stigma index β_1 + ageβ_2 + Moneyβ_3 + rural residenceβ_4 + partner ever testedβ_5 + incorrect beliefs β_5 + means of avoiding HIVβ_8 + polygamyβ_9 + ε

(Equation 8) ever been tested = β_0 + regional average of fear of casual contactβ_1 + ageβ_2 + Moneyβ_3 + rural residenceβ_4 + partner ever testedβ_5 + incorrect beliefs β_5 + means of avoiding HIVβ_8 + polygamyβ_9 + ε

[50] I made an assumption that condoms are normal goods.

(Equation 9) ever been tested = β_0 + regional average of moral stigmaβ_1 + ageβ_2 + Moneyβ_3 + rural residenceβ_4 + partner ever testedβ_5 + incorrect beliefs β_5 + means of avoiding HIVβ_8 + polygamyβ_9 + ε

(Equation 10) ever been tested = β_0 + regional average of enacted stigmaβ_1 + ageβ_2 + Moneyβ_3 + rural residenceβ_4 + partner ever testedβ_5 + incorrect beliefs β_5 + means of avoiding HIVβ_8 + polygamyβ_9 + ε

Regarding the influence of stigma on testing, the main hypothesis is that an increase in the regional average of stigma causes an underestimation of the risk of getting HIV, as well as an inhibition in getting tested for afraid of being stigmatized within the community. Thus, I expect stigma and testing to be negatively correlated. In general, we expect older women to have a higher number of pregnancies (on average) which increases their chances of getting tested, thus making age and testing positively correlated. Peltzer et al (2009) found evidence that "being employed and urban residence (...) were associated with knowledge of HIV status" (37). Thus, the hypotheses are that the variables "Money" and "Rural residence" should be positively and negatively related with testing, respectively. Moreover, if the respondent's husband has ever been tested (variable "partner ever tested") that will positively influence the respondent's choice of getting tested. Thus, I expect this variable to be positively correlated with testing. If the respondent maintains incorrect beliefs about HIV, then she will underestimate the need of getting tested (similarly to condom use). For this reason, incorrect beliefs and testing should be negatively correlated variables. Following the same reasoning, I expect that the decision to get tested is positively influenced by the knowledge regarding HIV transmission. Therefore, "means of avoiding HIV" should be positively correlated with testing. Finally, if the respondent's husband has other wives, that will increase her risk of getting infected with HIV/AIDS. This might give her incentives to get tested in order to assess her HIV status. Thus, polygamy and having ever been tested should be positively correlated.

5.2. Estimation results and discussion

Regarding equations 3-6 (see table 5), the correlation between condom use and the stigma index was found to be positive and statistically significant (B=0,518; P=0,031). The regional average of fear of casual contact and condom use were found to have a positive and significant correlation (B=-6,378; P=0,001).The regional average of moral stigma was found to be positive and statistically different from zero (B=2,11; P=0,021). On the contrary, the estimator for the regional average of enacted stigma was not statistically significant (B=1,24; P=0,513). The estimators for age, money and polygamy were found to significantly positive. The estimators for rural residence, incorrect beliefs and female bargaining power were not found to be statistically different from zero.

The above results contradict our expectations. The average level of stigma (whether if it's morally-based or due to fear of casual transmission) were found to have a positive impact on condom use. However, the effect should be negative: in a region with a high level of stigma, people would be afraid that, after buying condoms or requesting their spouses to use them, others would think that they were HIV-positive. Thus, seeking condom use could be result in stigmatization. However, the remaining stigma variables were found to be positively correlated with condom use, which seems to be counter-intuitive. One possible explanation is the extremely low number of respondents in this sample that reported condom use. In fact, only 2,73% admitted to having used a condom in the last sexual intercourse which may have affected the final estimation. Hamra et al. (2006) also could not find any evidence of a correlation between condom use and stigma in their paper. The estimators for rural residence and incorrect beliefs were found to be statistically insignificant. There was also no significant correlation between the belief that a wife can request her partner to use a condom if he has a STD and condom use. One explanation is the respondent does not suspect that her partner is carrying an infection. That theory does not seem very plausible because around 73% of the respondents said that they felt that they had some risk of getting HIV. Another possible explanation is that, although the woman can actually *believe* that she would have the right to ask for condom

use, she wouldn't dare making such request for cultural reasons. Income and polygamy were also found to be positively correlated with condom use, which supports our predictions.

After testing equations 6-10 (see Table 6), I found a negative and statistically significant correlation between the regional averages of fear of casual contact and testing[51] (B=2,45;P=0,000). On the contrary, the regional averages of enacted stigma and testing were found to be positive and statistically significant (B=1,46; P=0,032, respectively). Nevertheless, there was no statistically significant correlation between the regional average of moral-based stigma and testing (B=0,425; P=0,213). As for the stigma index, I found its estimator to be negative. Although it's not statistically different from zero with a 5% level of significance (F=-1,82>-1,96 and P=6,9%>α=5%), it's statistically significant if I take into account a 10% level of significance (F=-1,82<-1,64 and P=6,9% < α=10%). In all four regressions, the estimators for age, incorrect beliefs and polygamy were found to be significantly negative (P=0,00 < α=5%). The estimators for money and partner ever getting tested were found to be positive and statistically different from zero (P=0,008<α=5%). The estimators for rural residence and means of avoiding HIV were not statistically different from zero.

There was a significantly negative correlation between fear of casual contact and testing. Also, the stigma index was found to be negatively correlated with testing (but with a level of significance of 10%).These two last results support our predictions and corroborate the findings of Hamra et al (2006). As expected, money was found to have a positive and significant correlation with testing. This can be explained by the fact that people with higher levels of income are able to protect themselves from discrimination (as they can afford to hide any possible physical signs of the disease). Also, the existence of *correct* beliefs and previous testing by the partner were positively correlated with testing. The former variables lead the respondent to assess her level of AIDS risk more accurately, which may motivate her to get tested in order to confirm her status. There was no

[51] Please note that a positive answer to the question "Would you buy vegetables from a HIV-positive vendor?" means the *absence* of fear of casual contact.

evidence that rural residence and knowledge of means of avoiding HIV were significantly associated with getting tested.

Once again, the correlation between the three stigma dimensions and testing does not correspond to the expectations. I find no significant association between moral stigma and testing. This means that the decision to get tested does not have any significant correlation with the average moral judgement of PLHA at the regional level. Even if there's the possibility of getting tested anonymously, this result does not seem intuitive: if a considerable percentage of people blame PLHA for their status and think that they should be ashamed, then respondents should be fearful of getting tested for HIV and would have less incentives to do it. Another counter-intuitive result is that the regional averages of discrimination (enacted stigma) were found to be positively correlated with testing. The previous results are also opposite to those of Hamra et al (2006), which found evidence that “More expressed stigma was associated with less testing, less recent testing and less willingness to be tested”. Those results could have also been affected by the fact that I didn't take into consideration the timing in which that test may have happened. Unlike my predictions, age and polygamy were found to have a significantly negative correlation with testing. The latter result may also be explained by fear of discrimination: if the respondent's husband has other wives, then the first person to have an HIV-positive diagnosis (especially if the person is female) may be accused of being the one who brought the infection into the family and lose rights as a result. Since all the respondents are female and because Zimbabwean women are more discriminated than men, this decreases the possible benefits associated with getting tested.

6. Conclusion

First, let me acknowledge some of the limitations of this Work Project. Tthe DHS questions that were used in the construction of the stigma variables were not included in previous DHS Zimbabwe surveys. As a result, it was not possible to track the evolution of the different dimensions of stigma

over time and to compare it with the evolution of the HIV prevalence. Also, there were other stigma components (such as perceived stigma by PLHA, self-stigma and stigma directed towards women) that were not measured for lack of proper survey questions from which to choose from. The accuracy of the answers in the DHS report can be afected by the "social-desirability" bias (the answers may not completely honest because some respondents may given what they considered to be the "socially acceptable" answers). Another limitation is that enacted stigma variable can be overestimated: for example, if a number of respondents know a single PLHA that has been discriminated, then they will all answer "yes" and the "enacted stigma" variable will equal 1 (even tough there's a single case of stigmatization). Also, it was not possible to infer causality from the regressions.

HIV/AIDS-related stigma is translated into a more or less overtly hostile behaviour towards those who are perceived to be seropositive, and even their friends and family (see Aggleton). It includes all types of hurtful and discriminatory actions such as gossip, social isolation, being denied healthcare services and loss of legal rights (Nyblade and MacQuarrie 2006). It often comes from the belief that HIV is the product of misconduct and lack of values (see Aggleton). In this Work Project, I found evidence that personal characteristics influence stigma at the individual level. There's also evidence that stigma is negatively associated with HIV knowledge and income. Moreover, I found some evidence that the average level of stigma may have an impact on testing. However, I found a positive association between condom use and stigma, which does not corroborate the initial intuition. Still, it's important to continue the investigation of stigma and its impact on behaviour in order to strengthen the fight against the HIV epidemic.

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APPENDICES

Figure 1. Source: UNGASS 2008

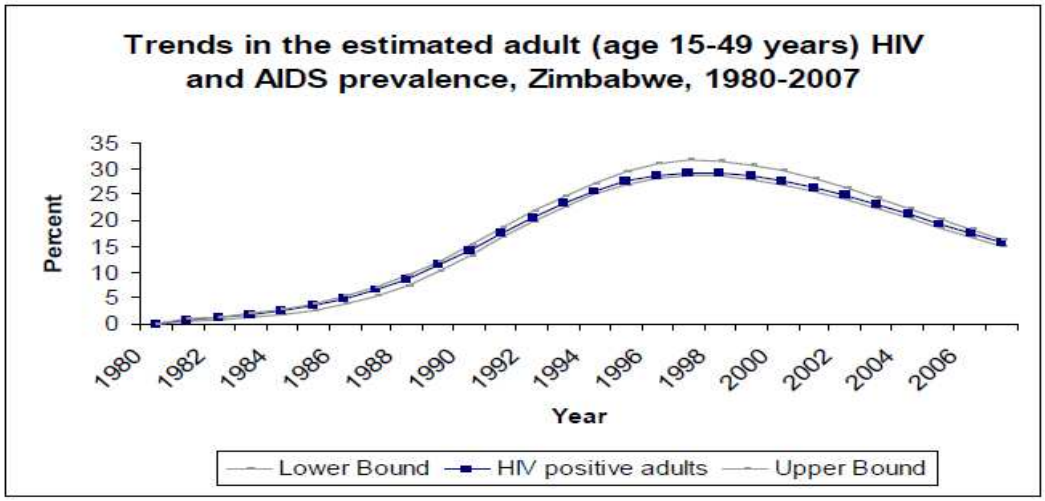

Figure 2.

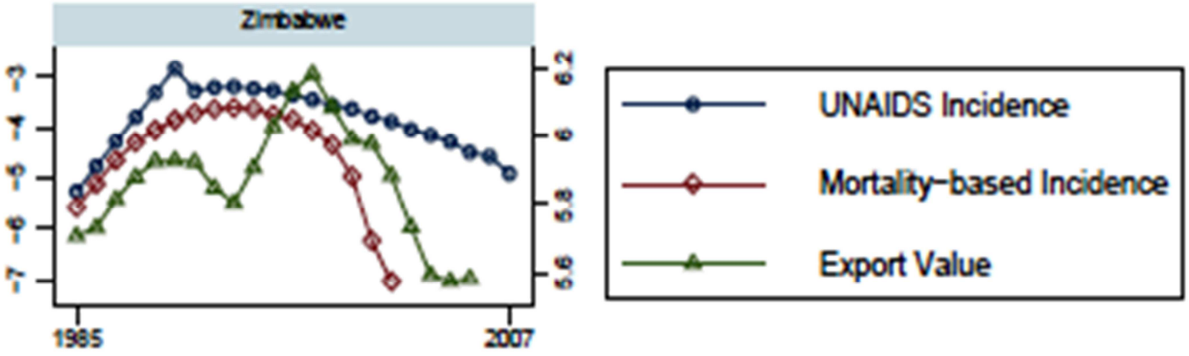

Table 1. List of questions from the DHS Survey 2005 that were used as variables.

1. **Willingness to buy vegetables from a vendor with the AIDS virus:**"Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus?"

2. **Attitude towards an HIV-positive teacher: "**In your opinion, if a teacher has the AIDS virus but is not sick, should she be allowed to continue teaching in the school?"
3. **HIV-positive individuals should be ashamed of their status:** "Do you agree or disagree with the following statement: People with the AIDS virus should be ashamed of themselves."
4. **HIV-positive individuals should be blamed for their status:** "Do you agree or disagree with the following statement: People with the AIDS virus should be blamed for bringing the disease into the community."
5. **Healthcare discrimination:** "Do you personally know someone who has been denied health services in the last 12 months because he or she has or is suspected to have the AIDS virus?"
6. **Social discrimination:** "Do you personally know someone who has been denied involvement in social events, religious services, or community events in the last 12 months because he or she has or is suspected to have the AIDS virus?"
7. **Age:** "How old were you at your last birthday?"
8. **Educational attainment:** the respondents had to report what was their level of education. Then, their education level would be categorized as one of the following: incomplete or complete primary education, incomplete or complete secondary education, higher education or none at all.
9. **Risk of getting HIV:** the respondent had to answer if she perceived herself as being at risk of becoming infected with HIV. If so, if she considered that risk to be "high", "medium" or "high".
10. **Knowledge of protection from HIV/AIDS:** "Is there anything a person can do to avoid getting AIDS or the virus that causes AIDS. If yes, what can a person do?"
11. **Healthy looking person may have AIDS:** "Is it possible for a healthy looking person to have the AIDS virus?"
12. **Get AIDS from mosquito bites:**"Can people get the AIDS virus from mosquito bites?"
13. **Get AIDS through witchcraft:** "Can people get the AIDS virus because of witchcraft or other supernatural means?"
14. **Knowing a seropositive person:** "Do you know someone personally that has the virus that causes AIDS or someone who died of AIDS?"
15. **Condom use:** "Did you use condom in the last time that you had sexual intercourse?"
16. **Testing:** "Have you ever been tested to see if you have the AIDS virus?"
17. **Female bargaining power variable:** "If a wife knows her husband has a disease that she can get during sexual intercourse, is she justified in asking that they use a condom when they have sex?"
18. **The respondent's husband has other wives:** "Does your husband/partner have other wives or does he live with other women as if married?"

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Condom use	3437	.0273494	.1631232	0	1
Mean_would~s	3437	.5827526	.0615459	.4962406	.6736402
Mean_moral~a	3437	.4795762	.135413	.2488585	.6616541
Mean_enact~a	3437	.1111789	.0585774	.0228311	.2159383
would_buy_~s	3437	.5874309	.4923681	0	1
moral stigma	3437	.4768694	.4995374	0	1
enacted stig	3437	.1117253	.3150741	0	1
age	3437	29.849	8.077344	15	49
Catholic	3437	.1242363	.3298989	0	1
Money	3437	.4844341	.4998304	0	1
edu.achievem	3437	.6694792	.4704691	0	1
rural dummy	3437	.6325284	.4821866	0	1
AIDS risk	3437	.7308699	.4435722	0	1
incorrect_~s	3437	.2670934	.4425059	0	1
means_of_a~V	3437	.9435554	.2308118	0	1
knows HIV+	3437	.4565028	.4981769	0	1
female barg	3437	.9010765	.2986027	0	1
polygamy	3437	.0794297	.2704477	0	1
testing	3437	.3924935	.4883766	0	1
healthy_ma~S	3437	.9124236	.282719	0	1
heard of AIDS	3437	1	0	1	1
knows_heal~n	3437	.0762293	.2654032	0	1
knows_sero~n	3437	.4565028	.4981769	0	1
partner test	3437	.1993017	.3995335	0	1
seropo~hamed	3437	.2618563	.4397088	0	1
seropo~lamed	3437	.2208321	.4148679	0	1
teacher_wi~S	3437	.7503637	.4328655	0	1
where_to_b~d	3437	.9135874	.2810132	0	1
HIV result	3437	.1771894	.3818845	0	1
STD	3437	.0354961	.1850569	0	1

Mean_w~s - average of fear of casual contact
Mean_m~a - average of moral stigma
Mean_e~a - average of encted stigma
would_buy_~s - would buy vegetables
incorrect_~s - incorrect beliefs
means_of_a~V - means of avoiding HIV
healthy_ma~S - healthy may have AIDS
knows_heal~n - healthcare discrimination of PLHA
knows_sero~n - social discrimination of PLHA
seropo~hamed - seropositives should be ashamed
seropo~lamed - seropositives should be blamed
teacher_wi~S - HIV+ teacher should be allowed to teach

	Proportion	Std. Err.	Nr. Observations
Condom use			
no	.9726506	.0027824	3343
yes	.0273494	.0027824	94
Fear of casual contact			
no	.4125691	.0083985	1418
yes	.5874309	.0083985	2019
Moral stigma			
no	.5231306	.0085208	1798
yes	.4768694	.0085208	1639
Enacted stigma			
no	.8882747	.0053743	3053
yes	.1117253	.0053743	384
Catholic			
no	.8757637	.0056272	3010
yes	.1242363	.0056272	427
Money			
no	.5155659	.0085258	1772
yes	.4844341	.0085258	1665
Edu. achievement			
no	.3305208	.0080249	1136
yes	.6694792	.0080249	2301
Rural residence			
no	.3674716	.0082248	1263
yes	.6325284	.0082248	2174
AIDS risk			
no	.2691301	.0075661	925
yes	.7308699	.0075661	2512
Incorrect beliefs			
no	.7329066	.007548	2519
yes	.2670934	.007548	918
Means of avoiding AIDS			
no	.0564446	.003937	194
yes	.9435554	.003937	3243
Knows seropositive person			
no	.5434972	.0084976	1569
yes	.4565028	.0084976	1868

Female bargaining power			
no	.0989235	.0050934	340
yes	.9010765	.0050934	3097
Polygamy			
no	.9205703	.0046131	3164
yes	.0794297	.0046131	273
Ever been tested			
no	.6075065	.0083304	2088
yes	.3924935	.0083304	1349
Healthy may have AIDS			
no	.0875764	.0048224	301
yes	.9124236	.0048224	3136
Heard of AIDS			
yes	1	0	3437
Healthcare discrimination			
no	.9237707	.0045271	3175
yes	.0762293	.0045271	262
Partner ever tested			
no	.8006983	.006815	2752
yes	.1993017	.006815	685
Social discrimination			
no	.9336631	.0042457	3209
yes	.0663369	.0042457	228
Seropositives should be ashamed			
disagree	.7381437	.0075002	2537
agree	.2618563	.0075002	900
Seropositives should be blamed			
disagree	.7791679	.0070765	2678
agree	.2208321	.0070765	759
Teacher_with_AIDS			
no	.2496363	.0073835	858
yes	.7503637	.0073835	2579

Table 3. Stigma averages per region

Region	used_c~m	Mean_w~s	Mean_m~a	Mean_e~a
manicaland	.0164835	.6736402	.5732217	.0794979
mashonaland cent	.0298103	.5695067	.5269058	.0964126
mashonaland east	.0296296	.6403509	.368421	.0482456
mashonaland west	.0227273	.5089974	.5861183	.2159383
matebeleland nor	.0181818	.6552901	.2559727	.0238908
matebeleland sou	.0116279	.4962406	.6616541	.075188
midlands	.0502092	.5147992	.5549683	.1173362
masvingo	.0101781	.5478724	.6258865	.1968085
harare	.023622	.616208	.3425076	.1253823
bulawayo	.0267062	.652968	.2488585	.0228311
Total	.0273494	.5827526	.4795762	.1111789

Mean_w~s - average of fear of casual contact
Mean_m~a - average of moral stigma
Mean_e~a - average of encted stigma

Table 4. Results of the estimation of equation 1.

Logistic regression — Number of obs = 3437; LR chi2(9) = 144.82; Prob > chi2 = 0.0000; Log likelihood = -2257.1204; Pseudo R2 = 0.0311

would buy veget.	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
age	.00137	.0046661	0.29	0.769	-.0077753	.0105153
Catholic	-.3153381	.1073322	-2.94	0.003	-.5257054	-.1049709
Money	.1642642	.1129185	1.45	0.146	-.057052	.3855805
educ.achiev	.673093	.0855941	7.86	0.000	.5053316	.8408544
Rural dummy	.4170261	.1163144	3.59	0.000	.189054	.6449982
AIDS risk	.322161	.0799194	4.03	0.000	.1655219	.4788001
Incorrect bel	-.4276526	.0808466	-5.29	0.000	-.5861089	-.2691962
Avoiding HIV	.0456402	.1529166	0.30	0.765	-.2540707	.3453512
Knows HIV+	.0801124	.0722419	1.11	0.267	-.0614791	.2217039
Constant	-.6298782	.257135	-2.45	0.014	-1.133854	-.1259028

lrtest A B

likelihood-ratio test — LR chi2(9) = 144.82; Prob > chi2 = 0.0000
(Assumption: B nested in A)

Table 5. Results of the estimation of equation 2

```
Logistic regression                                     Number of obs   =       3437
                                                        LR chi2(9)      =     384.78
                                                        Prob > chi2     =     0.0000
Log likelihood = -2186.2787                             Pseudo R2       =     0.0809

------------------------------------------------------------------------------
moral stigma |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         age |  -.0055402   .0048126    -1.15   0.250    -.0149727    .0038923
    Catholic |    .264254   .1107524     2.39   0.017     .0471832    .4813248
       Money |  -.7882192   .1111196    -7.09   0.000    -1.006009   -.5704289
educ.achiev  |  -.4649121      .0874    -5.32   0.000     -.636213   -.2936112
Rural dummy  |   .1179189   .1156005     1.02   0.308    -.1086539    .3444916
   AIDS risk |   -.605321   .0827743    -7.31   0.000    -.7675556   -.4430865
Incorrect bel|   .5259684   .0837899     6.28   0.000     .3617432    .6901936
Avoiding HIV |  -.1857124   .1614029    -1.15   0.250    -.5020563    .1306315
  Knows HIV+ |    .449774   .0745527     6.03   0.000     .3036533    .5958946
    Constant |   .9262069   .2664303     3.48   0.001      .404013    1.448401
------------------------------------------------------------------------------


 lrtest A B

ikelihood-ratio test                                    LR chi2(9)  =    384.78
Assumption: B nested in A)                              Prob > chi2 =    0.0000
```

Table 6 . Results of the estimation of equations 3-6.

```
_ogistic regression                                     Number of obs   =       3437
                                                        LR chi2(7)      =      39.53
                                                        Prob > chi2     =     0.0000
_og likelihood = -411.25019                             Pseudo R2       =     0.0459

------------------------------------------------------------------------------
 Condom use  |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
stigma index |   .5184095   .2408764     2.15   0.031     .0463004    .9905187
         age |    .045852   .0125104     3.67   0.000     .0213321    .0703719
       Money |   .6735468   .3232964     2.08   0.037     .0398974    1.307196
 Rural dummy |   -.245947   .3086043    -0.80   0.425    -.8508003    .3589063
Incorrect bel|  -.4754571   .2775772    -1.71   0.087    -1.019498    .0685842
 Female Barg |  -.2225875   .3688199    -0.60   0.546    -.9454613    .5002862
    polygamy |   .8254682   .3324559     2.48   0.013     .1738665     1.47707
    Constant |  -5.400119      .6817    -7.92   0.000    -6.736226   -4.064011
------------------------------------------------------------------------------

_ogistic regression                                     Number of obs   =       3437
                                                        LR chi2(7)      =      39.99
                                                        Prob > chi2     =     0.0000
_og likelihood = -411.02177                             Pseudo R2       =     0.0464

------------------------------------------------------------------------------
 Condom use  |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           x |  -6.378248   1.887719    -3.38   0.001    -10.07811   -2.678388
         age |   .0484286   .0124685     3.88   0.000     .0239909    .0728664
       Money |   .6876032   .3260608     2.11   0.035     .0485358    1.326671
 Rural dummy |  -.4216452    .315046    -1.34   0.181    -1.039124    .1958336
Incorrect bel|  -.4271384   .2774138    -1.54   0.124    -.9708594    .1165827
 Female Barg |  -.2669456   .3695437    -0.72   0.470     -.991238    .4573468
    polygamy |   .6985182    .333455     2.09   0.036     .0449585    1.352078
    Constant |  -1.311356   1.263622    -1.04   0.299    -3.788009    1.165297
------------------------------------------------------------------------------

x - Regional average of fear of casual contact
```

Logistic regression

Number of obs	3437
LR chi2(7)	39.99
Prob > chi2	0.0000
Log likelihood = -411.02177	Pseudo R2 = 0.0464

Condom use	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Y	2.110461	.9159407	2.30	0.021	.3152501	3.905672
age	.0479269	.0125161	3.83	0.000	.0233958	.072458
Money	.5493804	.323359	1.70	0.089	-.0843915	1.183152
Rural dummy	-.589977	.3364312	-1.75	0.079	-1.24937	.0694159
Incorrect bel	-.4258094	.2767989	-1.54	0.124	-.9683253	.1167066
Female Barg	-.15796	.3689929	-0.43	0.669	-.8811727	.5652528
polygamy	.7865917	.3314799	2.37	0.018	.1369031	1.43628
Constant	-5.919125	.775014	-7.64	0.000	-7.438125	-4.400126

Y - Regional average of moral stigma

Logistic regression

Number of obs	3437
LR chi2(7)	35.02
Prob > chi2	0.0000
Log likelihood = -413.50677	Pseudo R2 = 0.0406

Condom use	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Z	1.245167	1.90395	0.65	0.513	-2.486506	4.976839
age	.04717	.0125632	3.75	0.000	.0225466	.0717933
Money	.5840571	.3221739	1.81	0.070	-.0473921	1.215506
Rural dummy	-.3024707	.3133965	-0.97	0.334	-.9167166	.3117753
Incorrect bel	-.4255698	.2773873	-1.53	0.125	-.969239	.1180994
Female Barg	-.1990947	.3685293	-0.54	0.589	-.9213989	.5232094
polygamy	.821636	.3313398	2.48	0.013	.172222	1.47105
Constant	-5.166154	.6985878	-7.40	0.000	-6.535361	-3.796947

Z - Regional average of enacted stigma

Table 7 . Results of the estimation of equations 7-10

```
Logistic regression                                     Number of obs   =       3437
                                                        LR chi2(8)      =     608.60
                                                        Prob > chi2     =     0.0000
Log likelihood = -1997.9749                             Pseudo R2       =     0.1322

------------------------------------------------------------------------------
     Testing |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Mean_would~s |   2.452599   .6550635     3.74   0.000     1.168698    3.7365
         age |  -.0469542   .0050609    -9.28   0.000    -.0568734   -.037035
       Money |   .2907486    .117633     2.47   0.013     .0601922    .521305
rural dummy  |   .2967064   .1218899     2.43   0.015     .0578066   .5356062
partner test |   1.890785   .1015841    18.61   0.000     1.691684    2.089886
incorrect_~s |  -.3296973   .0905113    -3.64   0.000    -.5070962   -.1522984
means_of_a~V |   .2279182   .1780981     1.28   0.201    -.1211477    .5769841
    polygamy |  -.5230836   .1602656    -3.26   0.001    -.8371983   -.2089689
    constant |  -1.293688   .4607808    -2.81   0.005    -2.196801   -.3905738
------------------------------------------------------------------------------

 Mean_woul~s - average of fear of casual contact
 incorrect_~s - incorrect beliefs
 means_of_a~V - means of avoiding HIV


Logistic regression                                     Number of obs   =       3437
                                                        LR chi2(8)      =     596.13
                                                        Prob > chi2     =     0.0000
Log likelihood = -2004.2112                             Pseudo R2       =     0.1295

------------------------------------------------------------------------------
     Testing |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Mean_moral~a |   .4250517   .3413875     1.25   0.213    -.2440556    1.094159
         age |  -.0451239   .0050256    -8.98   0.000     -.054974   -.0352739
       Money |   .3086656   .1172886     2.63   0.008     .0787841    .5385471
rural dummy  |   .1675816   .1329361     1.26   0.207    -.0929684    .4281317
partner test |   1.902665    .101529    18.74   0.000     1.703671    2.101658
incorrect_~s |  -.3584756   .0904695    -3.96   0.000    -.5357925   -.1811587
means_of_a~V |   .2064172   .1771682     1.17   0.244     -.140826    .5536605
    polygamy |  -.5622956   .1589904    -3.54   0.000    -.8739111     -.25068
    constant |   -.017444   .2854277    -0.06   0.951    -.5768721    .5419841
------------------------------------------------------------------------------


 Mean_m~a - average of moral stigma
 incorrect_~s - incorrect beliefs
 means_of_a~V - means of avoiding HIV
```

```
Logistic regression                                     Number of obs   =       3437
                                                        LR chi2(8)      =     599.18
                                                        Prob > chi2     =     0.0000
Log likelihood = -2002.6878                             Pseudo R2       =     0.1301

------------------------------------------------------------------------------
     Testing |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Mean_enact~a |   1.460655   .6808761     2.15   0.032     .1261622    2.795147
         age |  -.0441969   .0050489    -8.75   0.000    -.0540925   -.0343014
       Money |   .3080042   .1171515     2.63   0.009     .0783915    .5376169
 rural dummy |   .1999397   .1217892     1.64   0.101    -.0387627    .4386421
partner test |   1.907484    .101545    18.78   0.000     1.708459    2.106508
incorrect_~s |  -.3792948   .0913184    -4.15   0.000    -.5582755   -.2003141
means_of_a~V |   .1835086   .1778921     1.03   0.302    -.1651535    .5321707
    polygamy |  -.5552703   .1590478    -3.49   0.000    -.8669984   -.2435423
    constant |   .0017822   .2634846     0.01   0.995    -.5146381    .5182026
------------------------------------------------------------------------------


 Mean_e~a - average of encted stigma
 incorrect_~s - incorrect beliefs
 means_of_a~V - means of avoiding HIV


Logistic regression                                     Number of obs   =       3437
                                                        LR chi2(8)      =     597.86
                                                        Prob > chi2     =     0.0000
Log likelihood = -2003.3459                             Pseudo R2       =     0.1298

------------------------------------------------------------------------------
     Testing |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
stigma_index |  -.1489208   .0820298    -1.82   0.069    -.3096963    .0118547
         age |  -.0454713   .0050209    -9.06   0.000    -.0553121   -.0356306
       Money |   .2992443   .1177246     2.54   0.011     .0685083    .5299803
 rural dummy |   .2370081   .1208205     1.96   0.050     .0002043    .4738118
partner test |   1.903489    .101474    18.76   0.000     1.704604    2.102374
incorrect_~s |  -.3268809   .0911447    -3.59   0.000    -.5055212   -.1482405
means_of_a~V |   .2105309   .1775884     1.19   0.236    -.1375359    .5585977
    polygamy |   -.553255   .1591163    -3.48   0.001    -.8651172   -.2413927
    constant |   .2420848   .2614312     0.93   0.354    -.2703109    .7544805
------------------------------------------------------------------------------

incorrect_~s - incorrect beliefs
 means_of_a~V - means of avoiding HIV
```